

ATTORNEY DOCKET NO.
MAV-005

DOC. ID
MAV005B

3

Please amend the Claims as follows:

Claim 1. (canceled)

Claim 2. (currently amended) ~~An engine as claimed in claim 1 further comprising:~~

A 4-stroke monoshaft multi-valve internal combustion engine comprising:

a first cam follower assembly configured to operate an intake valve of the engine,

a second cam follower assembly configured to operate an exhaust valve of the engine,

a cam follower channel assembly comprising a base circle channel circumferentially cut in a crank web attached to a crank shaft of the engine, a cam channel circumferentially cut substantially parallel to the base circle channel, a channel crossover cut to provide channel interconnectivity between the base circle channel and the cam channel, wherein when the first cam follower assembly is slideably engaged to the cam channel the intake valve is operated during a first-half rotation of the crank web, and wherein when the second cam follower assembly is slideably engaged to the cam channel the exhaust valve is activated during a second-half rotation of the crank web,

first and second L-shaped follower arms of the first and second cam follower assemblies respectively pivotally mounted to a single free standing pivot pin that is parallel to a crank axis of the crank web,

first and second transverse follower arms pivotally mounted at first and second distal ends of the first and second L-shaped follower arms,

first and second followers mounted on the first and second transverse follower arms respectively and disposed within the cam follower channel assembly, and

the first and second L-shaped follower arms operatively connected by first and second push-tubes to the intake and exhaust valves respectively and to reciprocate and activate the intake and

ATTORNEY DOCKET NO.
MAV-005DOC. ID
MAV005B

4

exhaust valves.

Claim 3. (previously presented) An engine as claimed in claim 2, wherein the first transverse follower arm is configured to slideably engage the cam follower channel assembly and urge the first distal end of the first L-shaped follower arm away from the crank web of the engine when the first cam follower assembly is slideably engaged to a first portion of the cam channel.

Claim 4. (previously presented) An engine as claimed in claim 3, wherein the second transverse follower arm is configured to slideably engage the cam follower channel assembly and urge the second distal end of the second L-shaped follower arm away from the crank web of the engine when the second cam follower assembly is slideably engaged to a second portion of the cam channel.

Claim 5. (canceled)

Claim 6. (currently amended) ~~An engine as claimed in claim 5, further comprising~~

A 4-stroke monoshaft multi-valve internal combustion engine comprising:

at least one intake valve and at least one exhaust valve of the engine,

a first cam follower assembly configured to operate at least one of the intake and exhaust valves of the engine,

a cam follower channel assembly comprising a base circle channel circumferentially cut in a crank web of the engine,

a cam channel circumferentially cut in the crank web substantially parallel to the base circle channel,

a channel crossover cut in the crank web interconnecting the base circle channel and the cam channel,

the first cam follower assembly being slideably engaged to the cam channel wherein the at least one of the intake and the exhaust valves is activated during a first-half rotation of the crank web, and

ATTORNEY DOCKET NO.
MAV-005DOC. ID
MAV005B

5

a fuel injection follower assembly configured to operate a fuel injection system of the engine and wherein when the fuel injection follower assembly is slideably engaged to the cam channel of the cam follower channel assembly such that the fuel injection system of the engine is activated during a second-half rotation of the crank web.

Claim 7. (currently amended) ~~An engine as claimed in claim 5, further comprising~~

A 4-stroke monoshaft multi-valve internal combustion engine comprising:

at least one intake valve and at least one exhaust valve of the engine,

a first cam follower assembly configured to operate at least one of the intake and exhaust valves of the engine,

a cam follower channel assembly comprising a base circle channel circumferentially cut in a crank web of the engine,

a cam channel circumferentially cut in the crank web substantially parallel to the base circle channel,

a channel crossover cut in the crank web interconnecting the base circle channel and the cam channel,

the first cam follower assembly being slideably engaged to the cam channel wherein the at least one of the intake and the exhaust valves is activated during a first-half rotation of the crank web, and

a crank shaft to which the crank web and a rotatable valve are attached and at least one opening in the rotatable valve alignable with a charge passage extending between a crank case chamber and a combustion chamber of the engine.

Claim 8. (canceled)

Claim 9. (currently amended) ~~An engine as claimed in claim 8, further comprising~~

A 4-stroke monoshaft multi-valve internal combustion engine comprising:

ATTORNEY DOCKET NO.
MAV-005

DOC. ID
MAV005B

6

a cylinder block housing a cylinder bore,
a piston reciprocally disposed within the cylinder bore and
connected by means of a connecting rod to a crank throw on a
circular crank web of a crank shaft,

the crank shaft being journaled for rotation about a crank
shaft axis within a crank case chamber of a crank case affixed to
a lower end of the cylinder block,

a combustion chamber defined as a region within the cylinder
bore between the piston and a cylinder head of the cylinder block
and above intake and exhaust valves,

a valve train chamber including a region within an engine
housing extending between the cylinder head and the crank case,

the valve train chamber operatively interconnected with the
crank case chamber through a charge passage in an internal wall
separating the crank case chamber from the valve train chamber,

the valve train chamber housing an intake manifold and a
mono-shaft valve operating system,

the mono-shaft engine multi-valve operating system including
an intake valve having an elongated stem,

a bottom end of the stem mounted to a cam follower assembly,

a cam follower channel assembly comprising a base circle
channel circumferentially cut in a crank web attached to a crank
shaft of the engine, a cam channel circumferentially cut
substantially parallel to the base circle channel, a channel
crossover cut to provide channel interconnectivity between the base
circle channel and the cam channel,

the cam follower assembly slideably engaged to the cam
channel wherein the intake valve is operated during a first-half
rotation of the crank web, and

a rotatable valve attached to a crank shaft and having at
least one opening alignable with the charge passage.

Claim 10. (previously presented) An engine as claimed in claim 9,
further comprising the opening being a sector having an included
angle that is a fraction of a 360 degree arc length of the crank
web.

ATTORNEY DOCKET NO.
MAV-005

DOC. ID
MAV005B

7

Claim 11. (previously presented) An engine as claimed in claim 9, further comprising the rotatable valve incorporated into the crank web.

Claim 12. (previously presented) An engine as claimed in claim 11, further comprising the opening being a sector having an arc length that is a fraction of a 360 degree arc length of the crank web.

Claim 13. (previously presented) An engine as claimed in claim 9, further comprising the crank case housing a one-way valve gaseously interconnected with a carburetor.

Claim 14. (previously presented) An engine as claimed in claim 9, further comprising the crank case housing a rotary valve or a piston valve gaseously interconnected with a carburetor.

Claim 15. (previously presented) An engine as claimed in claim 14 further comprising:

first and second L-shaped follower arms of the first and second cam follower assemblies respectively pivotally mounted to a single free standing pivot pin that is parallel to a crank axis of the crank web,

first and second transverse follower arms pivotally mounted at first and second distal ends of the first and second L-shaped follower arms by first and second ball joints respectively,

first and second followers mounted on the first and second transverse follower arms respectively and disposed within the cam follower channel assembly, and

the first and second L-shaped follower arms are operatively connected by first and second push-tubes to the intake and exhaust valves respectively and to reciprocate and activate the intake and exhaust valves.

Claim 16. (currently amended) ~~An engine as claimed in claim 8 further comprising.~~

ATTORNEY DOCKET NO.
MAV-005

DOC. ID
MAV005B

8

A 4-stroke monoshaft multi-valve internal combustion engine comprising:

a cylinder block housing a cylinder bore,

a piston reciprocally disposed within the cylinder bore and connected by means of a connecting rod to a crank throw on a circular crank web of a crank shaft,

the crank shaft being journaled for rotation about a crank shaft axis within a crank case chamber of a crank case affixed to a lower end of the cylinder block,

a combustion chamber defined as a region within the cylinder bore between the piston and a cylinder head of the cylinder block and above intake and exhaust valves,

a valve train chamber including a region within an engine housing extending between the cylinder head and the crank case,

the valve train chamber operatively interconnected with the crank case chamber through a charge passage in an internal wall separating the crank case chamber from the valve train chamber,

the valve train chamber housing an intake manifold and a mono-shaft valve operating system,

the mono-shaft engine multi-valve operating system including an intake valve having an elongated stem,

a bottom end of the stem mounted to a cam follower assembly,

a cam follower channel assembly comprising a base circle channel circumferentially cut in a crank web attached to a crank shaft of the engine, a cam channel circumferentially cut substantially parallel to the base circle channel, a channel crossover cut to provide channel interconnectivity between the base circle channel and the cam channel,

the cam follower assembly slideably engaged to the cam channel wherein the intake valve is operated during a first-half rotation of the crank web,

first and second L-shaped follower arms of the first and second cam follower assemblies respectively pivotally mounted to a single free standing pivot pin that is parallel to a crank axis of the crank web,

first and second transverse follower arms pivotally mounted

ATTORNEY DOCKET NO.
MAV-005

DOC. ID
MAV005B

9

at first and second distal ends of the first and second L-shaped follower arms by first and second ball joints respectively,

first and second followers mounted on the first and second transverse follower arms respectively and disposed within the cam follower channel assembly, and

the first and second L-shaped follower arms are operatively connected by first and second push-tubes to the intake and exhaust valves respectively and to reciprocate and activate the intake and exhaust valves.

Claim 17. (previously presented) An engine as claimed in claim 16, further comprising first and second follower arm springs mounted to the first and second L-shaped follower arms and biasingly engaging first and second transverse follower arms.

Claim 18. (previously presented) An engine as claimed in claim 17, further comprising intake and exhaust valve springs operatively connected to the intake and exhaust valves in biasing opposition to the first and second push-tubes and wherein the first and second follower arm springs having less spring force than the intake and exhaust valve springs respectively.

Claim 19. (previously presented) An engine as claimed in claim 18, further comprising a rotatable valve attached to a crank shaft and having at least one opening alignable with the charge passage.

Claim 20. (previously presented) An engine as claimed in claim 19, further comprising the opening being a sector having an included angle that is a fraction of a 360 degree arc length of the crank web.

Claim 21. (previously presented) An engine as claimed in claim 20, further comprising the crank case housing a rotary valve or a piston valve gaseously interconnected with a carburetor.

ATTORNEY DOCKET NO.
MAV-005

DOC. ID
MAV005B

10

Claim 22. (currently amended) An engine as claimed in claim 20, further comprising the crank case housing a ~~rotary valve or a piston~~ one-way valve gaseously interconnected with a carburetor.

Claim 23. (canceled)

Claim 24. (currently amended) ~~An engine as claimed in claim 23 further comprising:~~

A 4-stroke monoshaft multi-valve internal combustion engine comprising:

an intake cam follower assembly configured to operate an intake valve of the engine,

an exhaust cam follower assembly configured to operate an exhaust valve of the engine,

a cam channel assembly including intake and exhaust cam channels circumferentially cut in a crank web attached to a crank shaft of the engine,

a crossover channel circumferentially cut into the crank web and interconnecting the intake and exhaust cam channels,

the intake and exhaust cam follower assemblies slideably engaged to the intake and exhaust cam channels respectively,

the intake and exhaust cam channels having two different intake and exhaust cam profiles to provide disparate amounts of intake and exhaust valve openings and closures,

first and second L-shaped follower arms of the first and second cam follower assemblies respectively pivotally mounted to a single free standing pivot pin that is parallel to a crank axis of the crank web,

first and second transverse follower arms pivotally mounted at first and second distal ends of the first and second L-shaped follower arms by first and second ball joints respectively,

first and second followers mounted on the first and second transverse follower arms respectively and disposed within the cam follower channel assembly, and

the first and second L-shaped follower arms are operatively connected by first and second push-tubes to the intake and exhaust

ATTORNEY DOCKET NO.
MAV-005

DOC. ID
MAV005B

11

valves respectively and to reciprocate and activate the intake and exhaust valves.

Claim 25. (previously presented) An engine as claimed in claim 24, further comprising first and second follower arm springs mounted to the first and second L-shaped follower arms and biasingly engaging first and second transverse follower arms.

Claim 26. (previously presented) An engine as claimed in claim 25, further comprising intake and exhaust valve springs operatively connected to the intake and exhaust valves in biasing opposition to the first and second push-tubes and wherein the first and second follower arm springs having less spring force than the intake and exhaust valve springs respectively.

Claim 27. (previously presented) An engine as claimed in claim 26, further comprising a rotatable valve attached to a crank shaft and having at least one opening alignable with the charge passage.

Claim 28. (previously presented) An engine as claimed in claim 27, further comprising the opening being a sector having an included angle that is a fraction of a 360 degree arc length of the crank web.

Claim 29. (previously presented) An engine as claimed in claim 28, further comprising the crank case housing a rotary valve or a piston valve gaseously interconnected with a carburetor.

Claim 30. (currently amended) An engine as claimed in claim 29, further comprising the crank case housing a ~~rotary valve or a piston~~ one-way valve gaseously interconnected with a carburetor.